REMARKS

Claims 1-11 were pending in this application. Claims 1-11 have been cancelled, and new claims 12-46 have been added. The Specification has been amended to correct minor wording issues. No new matter has been added.

Objections to the Drawings

The Examiner objected to the drawings and the specification. In particular, the Examiner pointed to paragraph [088] which appeared to be inconsistent with Figure 10. In response, applicants have amended paragraph [088] of the specification to be consistent with Figure 10. Furthermore, applicants submit herewith formal drawings to replace the originally filed drawings submitted with this application.

Objections under 35 U.S.C. § 101

Claims 1-11 stand rejected under 35 U.S.C. §101 as being directed to nonstatutory subject matter. The Examiner is of the opinion that the present claims are directed to a "computer system" which does not have a practical application and which does not produce a real-world result. The Examiner cites to various Patent Office regulations that for a patent claim to have a "practical application", the focus is not on whether the steps taken to achieve a particular result are "useful", "tangible" and "concrete", but rather it must be the final result achieved by the invention which is "useful", "tangible" and "concrete". According to Patent Office practice, "useful" means that the final result is specific, substantial and credible; "tangible" means that the result is real world and not abstract; and "concrete" means that the result is substantially repeatable and not unpredictable. (MPEP 2106).

Applicants respectfully disagree with the Examiner that the present claims are directed to a nonstatutory "computer system". The method and system of the present invention relates to the generation of various signals (e.g., voltages), which are physical things, and not abstract data signals. Nevertheless, in order to address the issues raised by the Examiner, applicants are

presenting herewith a new set of claims, which it is respectfully submitted overcome the issues raised by the Examiner.

In view of the newly presented claims, it is respectfully requested that these rejections under 35 U.S.C. § 101 be withdrawn.

Claim rejections under 35 U.S.C. § 112

Claim 2 stands rejected under 35 U.S.C. § 112, first paragraph, as being based on a non-enabling disclosure. The Examiner states at page 5 of the Office Action: "Pointing out which spike generation is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure." This statement is not entirely understood. The Examiner goes on to indicate that claim 2 states preserving a phase of the oscillation following spike generation, but that in claim 1, there are two different spikes being generated. In response, applicants have presented new claims 13, 21, 29 and 38 which recite that the phase is preserved following either spike generation, since the Specification does not explicitly limit it to one or the other of the spike generations (see p. 14 of Specification).

Claim 2 also stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner states that the recited language of preserving the phase of the oscillation is unclear as to whether the preserving is at some location before the threshold, or whether the preserving refers to outputting the phase as part of the result. In response, new claims 13, 21, 29 and 38 have been presented which make it more clear that the preserving of the phase refers to the phase of the output signal.

Claim 11 stands rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Claim 11 recites that the degree of coupling between processing units within a cluster is greater than the degree of coupling between the processing units of the cluster and other processing units. The Examiner states that this is not described in the Specification. Applicants respectfully disagree with the Examiner. The Specification discusses in

detail in numerous instances the concept of coupling between processing units, e.g., neurons. Moreover, the Specification specifically states that "[g]enerally, the coupling between units inside a cluster is stronger than between units at the boundary of clusters." (p. 48, line 22 to p. 49, line 1). This directly supports claims 19, 27, 36 and 44, which include this subject matter from original claim 11.

The Examiner also takes issue with the term "cluster" as used in claims 10 and 11, stating that this term is indefinite and is not defined in the application. Applicants respectfully disagree with the Examiner. The term "cluster" is clearly used in the Specification to refer, for example, to a group of neurons which are related in some fashion. As discussed in detail at p. 33, the term "cluster" does not refer to a specific size group of neurons, but rather to some grouping of neurons where the "shape", "size" and "distribution" of the cluster is controlled by certain chemicals which influence the degree of coupling.

Rejections Under 35 U.S.C. §102(b)

Claims 1-3, 5-8 and 10-11 stand rejected under 35 U.S.C. §102(b) as being anticipated by Maass, "Pulsed Neural Networks". Applicants will treat this rejection as if it were being applied to the newly presented claims. It is the Examiner's opinion that "Pulsed Neural Networks" discloses all the elements of independent claim 1. Specifically, with respect to generating a first spike when a first threshold is exceeded and generating a second spike when a second threshold is exceeded, as required by claim 1, the Examiner states that this is disclosed in Figure 2-12 of this reference.

Applicants respectfully disagree with the Examiner on this point. The newly presented claims recite the generation of a composite output signal in the form of an oscillatory signal combined with one or two spike signals, the first and second spike signals being generated based on different threshold values. In contrast, there is no mention in Maass, either in Figure 2-12C or the accompanying text, of high and low thresholds and generating a spike signal based on different thresholds. It is not clear at all from the cited Maass reference, that there is such generation of

output signals as in the presently claimed invention. The Examiner points to the two layer arrangement of Figure 2-12C of Maass, and without apparent support states (p. 7):

> Maass illustrates a 2 layer neural network. Each neuron in each layer has a 'threshold', therefore whatever the output of the neural network in figure 2.12, it would have to pass through 2 thresholds.

It is respectfully submitted that this aspect of Maass, regardless of whether it is actually adequately disclosed in Maass is not relevant to and therefore does not anticipate the present claims. This aspect of Maass pointed out by the Examiner appears to be a serial arrangement of the two layers, with apparently each layer having a threshold. Thus, it would seem that the ultimate output in Maass would be in effect "gated" by the serially connected threshold-based neurons. This is different from the presently claimed invention where the output is not so serially connected, but is rather a composite output signal containing an oscillation signal and one or two spike signals as the case may be.

With respect to claim 7, the Examiner states that the "Pulsed Neural Networks" reference discloses the claimed "variable degree of coupling" between processing units. On this point, the Examiner relies on Figure 2-12 of the reference. However, a review of this figure reveals that it discloses only the summation of various inputs into a neuron (Figures 2-12 A and B). Figure 2-12C illustrates a network of neurons with just lines connecting them--there is no mention of variable coupling between the neurons. Taken as a whole, this is not the same as the concept of "variable degree of coupling" between processing circuits as set forth in original claim 7, and new claims 15, 23, 32 and 40.

Rejections Under 35 U.S.C. §103

Claims 4 and 9 stand rejected under 35 U.S.C. §103(a) as being unpatentable over "Pulsed Neural Networks" in view of Maas, "Model-Based Control for Ultrasonic Motors". The Examiner admits that the "Pulsed Neural Networks" reference does not disclose the control of an output device in accordance with the phase of an oscillation. The Examiner asserts that this latter

feature is disclosed in the "Ultrasonic Motors" reference. Further, it should be pointed out that in new claims 13, 21, 30 and 38, the phasc of the output signal of one circuit (which is used, for example, to control an actuator) is maintained in a relative sense to the phase of another output circuit, i.e., there is some coordinated relationship between the phases of the two circuits.

Applicants respectfully disagree with the Examiner on this point. A review of the "Ultrasonic Motors" reference indicates that it does not disclose this claimed use of phase. Rather, in this reference, there is merely a mention of adjustment of phase of the input voltage signal to optimize motor conditions (p. 166, column 1, lines 24-26). This is different from maintaining the phase in an output signal in a relative sense to the phase of other output signal of other circuits, as set forth in the present claims.

CONCLUSION

Each and every point raised in the Office Action, dated December 15, 2006, has been addressed on the basis of the above amendments and remarks. In view of the foregoing it is believed that the pending claims, as amended, are in condition for allowance and it is respectfully requested that the pending claims be allowed and the case passed to issue.

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Respectfully submitted,

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